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ABSTRACT

Central Cabarrus High School (CCHS), near Charlotte, North Carolina, uses the PLATO computer assisted instruction system primarily to support remediation programs that are intended to help low performing students meet graduation requirements. CCHS used PLATO to: (1) provide an option for students to earn credit for failed courses or their associated end-of-course tests; and (2) to help students review and develop skills needed to pass the state competency examination. An evaluation was conducted to describe the manner in which the PLATO program has been used by CCHS and to examine the effectiveness of the remediation and North Carolina Competency Test (NCCT) review efforts. Of the 375 students who had failed one of the courses required for graduation since January 1999, 320 students qualified for remediation and have earned credit using PLATO in the YES program. Every student who qualified for remediation earned credit. Student NCCT scores increased in December 2000 and May 2001 retests. A significant positive relationship was identified between PLATO use and the NCCT test scores for both the December 2000 and May 2001 retests. Teachers, the CCHS principal, and the school district's superintendent were positive about PLATO and believed that it contributed to student improvement on the NCCT. (SLD)

PLATO®

Evaluation Series

Central Cabarrus High School, North Carolina

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Executive Summary

Central Cabarrus High School (CCHS) is located near Charlotte, North Carolina. The school uses PLATO primarily to support remediation programs that are intended to help low performing students meet graduation requirements. Specifically, CCHS used PLATO: (1) to provide an option for students to earn credit for failed courses or their associated end-of-course tests and (2) to help students review and develop skills needed to pass the state competency exams.

The purpose of this evaluation report is to describe the manner in which the PLATO program has been used by CCHS, to examine the effectiveness of the remediation and NCCT review efforts.

Some of the important results of this evaluation include:

- Of the 375 students who have failed one of the courses required for graduation since January 1999, 320 students qualified for remediation and have earned credit using PLATO in the YES program. Thus, every student who qualified for remediation earned credit.
- Student NCCT scores increased in both the December 2000 and May 2001 re-tests. Students scored higher in December 2000 in both Math (163.6 vs. 158.8) and Reading (150.1 vs. 149.7) than they did on the May 2000 test. Students who re-took the May 2001 improved over the December 200 test from 158.6 to 160.4 in Math and from 146.3 to 148.8 in Reading.
- A significant positive relationship was identified between PLATO usage and the NCCT test scores for both the December 2000 and May 2001 re-tests
- Teachers, the CCHS principal, and the district's superintendent were positive about PLATO and believed that it contributed to student improvement on the NCCT.

Introduction

This report describes the PLATO-supported strategies used by Central Cabarrus High School (CCHS), North Carolina and examines data from the 2000-2001 academic year and the summer of 2001. CCHS used PLATO primarily to help students meet two challenging graduation requirements: (1) to help students who failed the required high school competency exam, and (2) to allow students to earn credit for required courses previously failed.

The strategy to help students meet the first requirement was fairly straightforward. Students who failed either part (Mathematics or Reading) of the North Carolina Competency Test (NCCT), were required to take a review course in the PLATO lab to prepare for re-taking it. The second graduation requirement requires all students to pass not only English 1, Algebra 1, Algebra II, Geometry, Biology, Physical Science, Chemistry, US History or Economics, and Legal and Political Systems, but to pass a state administered end-of-course exam in each course as well. The state's goal was apparently to certify that all graduates demonstrate identified critical competencies.

Several years ago, the state began to decentralize and grant the local school districts some flexibility in dealing with students who fail one or more of the required courses or end-of-course exams. If, through remediation, students demonstrate mastery over the specific required proficiencies covered in the course, they can earn credit for the course without either re-taking the course or passing the end-of-course exam. This flexibility enabled CCHS to use PLATO to provide students with the remediation opportunities necessary for students to earn credit to graduate.

The district adopted PLATO largely because the Assistant Superintendent of Instruction, Dr. Gary Cone, believes that computer-assisted instruction provides tremendous potential to help

marginal student succeed. He believes that students who struggle academically in the regular classroom deserve "a different" experience and opportunity to succeed, and PLATO provides such an opportunity. The district used PLATO on a limited basis for several years. But in January 1999, after a successful pilot program, usage increased dramatically after the district adopted PLATO as the primary remediation tool to assist staff in remediation efforts. This PLATO-supported remediation strategy is named the Y.E.S. (Youth Experiencing Success) Program. The purpose of this evaluation report is to describe the manner in which the PLATO has been used at CCHS, to examine the effectiveness of the NCCT review and remediation efforts, and to suggest possible areas of improvement for future PLATO implementation and use.

Program Description

Learners. Ms. Anne Shuping, the CCHS principal, describes the school as diverse. The learners in the PLATO lab considered in this report, because of the nature of the implementation, are the lowest performers in the school. It is common for at-risk students to have a short attention span in school, they are often poor readers and/or do not like to read, question the relevance of the things they learn in school, often feel disenfranchised from the school environment, and expect to, and in some cases *are expected* to, fail. They need as much one-on-one attention as possible.

Program Goals. CCHS uses PLATO for a variety of instructional purposes across the curriculum, but the main goal is remediation. Students who fail the Reading and/or Math portions for the NCCT are placed in a review skill course to prepare to re-take the test. In addition, CCHS used PLATO to support students who fail a course required for graduation or a

state end-of-course exam. The goal is simply to provide effective instructional support for low-ability, or low performing students that enables them to graduate.

Instructor Characteristics and Role in Program. There are three instructors who play prominent roles in the PLATO lab. A lab manager is responsible for the technical and data/account management issues in the lab. In the Y.E.S. program, a full-time certified teacher facilitates student work through the curriculum, and answers content questions when possible. The IT coordinator is responsible to helping support teachers in the general curriculum who want to use PLATO with their classes. All three also share the staff training responsibilities.

Many other CCHS faculty have played an important role in the YES program. Faculty who teach the required courses collaborated in designing the PLATO curriculum that is used for remediation. This effort was a critical step in creating a resource that satisfied the state learning objectives for these required courses.

PLATO Implementation Description

There are two instructional labs with 30 computers in each for general use in addition to two remediation labs. The NCCT review lab has 10 computers and the remediation lab supports 13 machines.

A concerted effort to use PLATO for remediation began in January 1999. Students who fail a required course or an end-of-course exam, have to either re-take the course or take part in the Y.E.S. remediation program. Whether they re-take the course or go to remediation is determined by a district-wide committee comprised of teachers and administrators. The committee makes the decision based on the best interests of the student. Students who badly fail a course, for example, will likely be required to repeat the course. However, most students do

qualify to participate in the Y.E.S. program. Students assigned to Y.E.S. are placed in the custom-developed curricula designed to meet the state learning objectives for each of the required courses. Y.E.S. labs are available after school and during the summer. Students have one semester plus one summer to master 80 % of the required curriculum and earn credit.

Data supplied by CCHS indicate that of the 375 students who have failed one of the courses required for graduation since January 1999, 320 students have earned credit using PLATO in the Y.E.S. program. Every student who qualified for remediation earned credit. Of the 55 students not recommended for remediation, nine re-took and passed the course, 21 have not repeated the course to date, and 25 withdrew or transferred.

All students must pass both components of the NCCT in order to graduate with a diploma, and can re-take the test as often as necessary until age 21. Students who do not pass the NCCT components graduate with a "Certificate of Graduation." According to CHHS, all students on the diploma track eventually pass the NCCT and earn their diplomas on re-take, even if it means coming back after they graduate. The NCCT is typically administered three times per year -- May, December and July. Students who fail part of the NCCT are enrolled in a review course that meets during regular school hours. Students are placed in the PLATO modules using *Fastrack.* Once placed in the NCCT-aligned PLATO curriculum, students then work at their own pace through the curriculum, advancing to the next module after passing the module mastery test. The lab instructors facilitate student progress individually. In all, fifty students between January 1999 and December 2001 have used the PLATO review course to pass the NCCT.

In addition to the Y.E.S. program, individual departments used PLATO to varying degrees. The science department used PLATO often. They used it primarily to supplement instruction, such as introducing or reviewing a concept, or other full-class activities. Math and

English also used the PLATO lab in similar ways but on a smaller scale. However, data from these applications were not included in this evaluation.

Evaluation Design

The present evaluation examines several data sources. Telephone interviews with several key staff and faculty were conducted and analyzed. PLATO module-mastery data and the NCCT scores for the twenty-seven students who worked in the review lab during 2000 – 2001 were also analyzed. This sample, albeit small, allowed for limited testing of the effectiveness of the NCCT review effort by examining gain scores and by correlating PLATO use to NCCT score improvement. This evaluation does not attempt to examine each of the ways PLATO was used at CCHS. Rather, it concentrates on the two main uses. This approach allows the examination of the overall remediation effort, and to what extent PLATO has contributed in that success.

Data Analysis. Interview data are examined here. Where possible, common threads and main ideas were collapsed and summarized. In the quantitative analysis, cautiously performed statistical tests are included, although the sample size was too small to conclude that any observed differences were caused by the treatment. The analyses are included for information only and caution in interpreting their significance is urged. Correlations and paired sample T-tests were performed to test differences in NCCT scores. All tests were performed using a .05 level of significance[1]. In other words, student gain scores were examined to determine if the gains were likely due to the CCHS intervention or are a result of random fluctuation.

Evaluation Implementation

Procedures for data collection. The evaluator interviewed all participants via the telephone between June 2001 and January 2002, using the PLATO site overview questions to structure the interviews, and then allowing the inquiry to be guided by the concerns and perspectives of the participants.

Results

The results are organized into two sections, Interviews and NCCT scores. Key points from the interviews and salient faculty comments are summarized. The NCCT scores section examines the NCCT scores for the students who participated in the Math and Reading skills review courses over the last three NCCT tests. All students in the examined sample failed either the Math component, the Reading component, or both components of the May 2000 NCCT. Student scores were analyzed for tests administered in December 2000, and May 2001. In addition, Pearson product moment correlations were calculated between PLATO modules mastered and the NCCT scores.

Interviews

The telephone interviews conducted by the evaluator from June 2001 through January 2002 are summarized and analyzed in this section.

Ms. Terry Scott, Lab Teacher. Ms. Scott, a certified Social Studies teacher, taught for over twenty years at CCHS before moving to the PLATO lab. She reported during our January 2002 interview, "We use the lab for end-of-course remediation. Students can earn credit for a failed course by taking remediation in the lab instead of re-taking the entire course. The teachers (who teach courses where exams are required by the state) designed the PLATO curriculum for

[1] The .05 alpha level of significance is a widely accepted threshold for statistical tests; findings that exceed

each of the required courses. Each of the courses are specifically aligned to the state objectives. They went through PLATO and planned the curriculum. Students have to master 80 % of the curriculum to earn credit. This is an after school program – and two weeks in the summer. A few students come in during the school day but that is the exception – like seniors who use their free periods to make up credit they need to graduate."

According to Ms. Scott, over the last academic year about 100 students completed remediation and earned credit for a failed course. This compares to approximately 25 students who had to re-take the failed course. "I really like the program (PLATO). Students do succeed in it . Only one or two students (who failed a required course) were not able to take remediation."

Although Ms. Scott was positive about most of the PLATO curriculum, she voiced disappointment with History. "History was weak. The teachers do not like it. They (History and ELPS teachers) feel it is boring and too simplistic. It doesn't cover all the content in the state objectives. But we just installed the *WorldView* upgrade and I've heard from some teachers that it is better. I have not looked at it too closely myself yet."

Ms. Linda Creamer, Lab Manager. I interviewed Ms. Creamer in early July and again in early August, 2001. Ms. Creamer's role was support. Despite recently overcoming some frustrating technical problems, Ms. Creamer was in general, positive about PLATO. "Overall, it has been very effective. We have remediated 320 kids since January 1999 when we started." Her perceptions are important as she, along with Ms. Scott, worked in the lab more than any other staff members. Mrs. Creamer was also instrumental in supplying the evaluator with PLATO and state competency test scores for students who worked in the lab during the Fall 2000 or Spring 2001 semesters.

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this threshold, i.e., < .05, are believed NOT to be a result of chance.

Ms. Anne Shuping, Principal. I spoke to Ms. Shuping in June 2001. Ms. Shuping was very positive about the program. "PLATO has been great. We have had fantastic success. We started using it several years back. A new high school in the district had a new lab and they were a pilot (for PLATO). They used it for a couple of years before the Superintendent of Curriculum and Instruction (Mr. Cone) decided that all the high schools should use it to remediate students who fail either a course or the end of course state test. This is called the Y.E.S. program, 'Youth Experiencing Success.'"

Ms. Shuping explained how Y.E.S. works. "A student who fails a course required for graduation or the end of course state test in one of these subjects (which represent 25% of the course grade), has two options for remediation to earn credit for the course; either re-take (and pass) the course or work in the PLATO lab to acquire the proficiencies needed for course credit." In almost all cases, Ms. Shuping explained, the students would opt for the PLATO curriculum, but the choice is not theirs to make. The district uses a review process to decide which option is better based on each student's circumstances. A committee comprised of two administrators and one teacher of another school reviews each case and considers all information including the course instructor's recommendation. "The committee decides if the student must re-take the course or if they can go to the PLATO remediation lab. If they re-take the course, they must re-take and pass the end of course exam." The principal further explained that students have one semesters and the summer, to complete the PLATO remediation. "If they are assigned to the PLATO remediation lab, they must achieve 80% mastery in PLATO, but they do not have to re-take the test – they get credit and move on. If they fail in the fall (semester), they have the spring (after school) and summer to complete the PLATO remediation. If they fail in the spring, they have the summer and fall."

Overall, Ms. Shuping is very pleased. "It has been great. All but US History which has been a problem for the entire state – it is just too much information. Our teachers get in as much as possible but they can't cover it all. Many feel we need to go to a one-year option like we did with Algebra I (A&B). Students really like the remediation option because they don't have to re-take the course and we provide students who do not get it the first time for whatever reason, a chance to succeed and graduate."

Ms. Shuping indicated that CCHS used PLATO to support other strategies. "We use PLATO two other ways: 1) to pull students out if they are struggling (before they fail) and; 2) for full class activities where teachers take their class to the lab and introduce or review topics, practice etc.

Dr. Gary Cone, Assistant Superintendent. Dr. Cone was the driving force behind the district's Y.E.S. program. His interest in computer-assisted instruction dates back to his doctoral research when he examined the computer's potential to help at risk secondary students. He views PLATO as providing an option to students who struggle in the classroom. "I believe that kids should have another option (rather than re-taking a course). These kids were not successful the first time around – and it could be due to a number of factors like missed time, behavior problems. Many times the student is trying, but simply doesn't connect with a given teacher." Dr. Cone does not assign blame in such situations. "To me, if a student doesn't get it in the classroom the first time through, it doesn't make sense to force him to go through the same experience again, often with the same teacher. These students can often thrive in a Y.E.S. Center, and get credit for the course they failed. I think the students really like it and it has been a very useful tool for us."

Dr. Cone elaborated on the Y.E.S. program. "The state policy stipulates that students who fail a required course or an end of course exam must either be remediated or re-take the course." But the state policy allows the individual districts to determine which. Dr. Cone continued, "The passing rate on the end of course test is 70. If a student fails badly, say below 55, then the review committee will in all likelihood recommend that the student re-take the course. But if the student is close to passing, then the committee will recommend remediation in the Y.E.S. Center. When a student is assigned to remediation, the teacher generates a plan that is covered with (an individualized) PLATO curriculum. There are also cases where a student fails a course with a particularly demanding teacher, but passes the end-of-course test. That student is an ideal candidate for remediation."

PLATO is also used in the district's alternate high school. The alternate school houses approximately 30 high- and middle-school students who have been suspended from school for three or more days. According to Dr. Cone, PLATO provides the opportunity for these students to earn high school credit and keep pace with their classmates.

Ms. Susan Dalton, IT Coordinator Ms. Dalton works with the rest of the teachers in CCHS who want to use PLATO on their classes. Most departments use it to some degree but the science department uses it most extensively. "The sciences use it a lot; Earth Science, Chemistry, Physics, Biology. The science teachers tell me that the science modules are really good." But she reported that the teachers in the Social Studies department were less enthusiastic. "The Social Studies teachers don't like it. In this day and age – compared to multimedia and the internet, colors, sound – the screens seem very drab and boring. But," Ms. Dalton added, "I am told

WorldView will make it a lot better[2]." Math uses it somewhat to introduce and review material, mostly in full class activities, and to supplements lectures etc." She noted that the science department has been using it less this year because the Internet offers so many curriculum and lesson resource.

Training is available for teachers to use *Fastrack* and other PLATO features. "I have done workshops. Mrs. Creamer and Mrs. Scott will do individual help and workshops. And we designate six teachers – one from each department - who are PLATO trainers. Nor every one of them is trained yet, but they will be when they train their colleagues.

She believes it has worked particularly well with the lower ability students. "It works really well for the remediation program. The (lab) teacher can't know about *all* topics, so PLATO can provide the specific content. Ms. Dalton observed some teachers not wanting to use it because there is "considerable start up time." Other teachers shy away because it takes a lot of start up time."

NCCT Scores

A total of 27 students failed one or both parts of the May 2000 NCCT and were enrolled in the NCCT review course in the Fall 2000 and/or Spring 2001; seven students failed Reading only, 12 failed Math only, and eight failed both components. Of the seven students who failed only Reading, five passed on either the December 2000 or May 2001 re-test. In Mathematics, six of the 12 students who failed in May 2000 passed in either December 2000 or May 2001, but two students (one of whom withdrew from school) never re-took the test. Of the eight students who failed both components, two never re-took either component (one transferred to Occupational

[2] The district upgraded to PLATO's *WorldView* Social Studies curriculum after the period of this evaluation, so data from it are not included here. -*ed.*

Education), two passed Math only, one passed Reading only (none passed both), two never re-took Math, and one other never re-took Reading.

NCCT scores of students who re-took the December 2000 exam after failing in May 2000 increased on both the Math and English components. Paired sample t-tests revealed that in Math, students scored significantly higher on the December 2000 re-test ($\underline{M}$ = 163.6) than they did on the May 2000 test ($\underline{M}$ = 158.8), t(df = 12) = 2.502, $\underline{p}$ = .028 (effect size = .84). In other words, those students who failed the May Math component and who were enrolled in the NCCT skills courses, scored higher on the December re-test. Reading scores ($\underline{M}$ = 150.1) in December 2000 improved fractionally over May 2000 ($\underline{M}$ = 149.7), but the difference was not significant, t(df = 11) = .26, $\underline{p}$ > .05.

Mean scores for students who re-took the May 2001 test after failing the December exam improved in both Math, and in Reading. Math scores increased from 158.6 to 160.4 and Reading improved from 146.3 to 148.8. However, paired sample t-tests revealed that neither improvement was statistically significant (Math, t(df = 6) = .51, $\underline{p}$ >.05; Reading, t(df = 5) = 1.75, $\underline{p}$ >.05).

In order to attempt to assess PLATO's contribution to the success of NCCT review course, student PLATO performance was correlated to test scores. PLATO modules, supplied by Ms. Creamer, are identified by three clusters, Reading (which contains 199 total modules), Language (137 modules), and Mathematics (141 modules). As Table 1 indicates, several significant correlations between the NCCT Math and Reading scores and the PLATO usage data were identified. In other words, student mastery of the PLATO modules[3] was related to higher

[3] Note that a learner *masters* a PLATO module by studying it and passing the mastery test. If the learner ships the module by passing the module, without study, then the system shows the module as *exempt*. Thus, students reported here actually studied the PLATO modules and mastered them. – *ed.*

NCCT scores. The total number of Math modules mastered was related to performance on both the December and May Math re-tests, with a significant correlation in December 2000, (r = .59, p = .017, n = 13), and approaching significance in May 2001, (r = .57, p = .055, n = 9). Similarly, total Reading and Language modules mastered was related to performance on both the December and May Reading re-tests, with the difference reaching significance in the May 2001 for the Reading modules (r = .831, p = .020, n = 6) and the Language modules (r = .833, p = .020, n = 6).

Table 1. Correlations between PLATO Module Mastery and NCCT Test Scores

		Correlation with PLATO Modules		
NCCT Test	N	Math	Reading	Language
December 2000 Reading			.30	.13
December 2000 Math		.55*		
May 2001 Reading			.83*	.83*
May 2001 Math		.57		

Note. * indicates significance <.05.

Discussion

CCHS used PLATO to support two main strategies aimed at ensuring that students meet graduation requirements: (1) to provide an option for students to earn credit for failed courses or their associated end-of-course tests and (2) to help students review and develop skills needed to pass the state competency exams.

Both strategies seem to be successful and as PLATO is the main instructional resource used in each program, clearly, PLATO deserves part of the credit. Parsing out how much credit, or identifying causal relationships statistically is methodologically difficult and beyond the scope of this study. But while the statistical evidence is inconclusive (because of small sample sizes), the trends are positive and when taken together with the opinions and beliefs of the CCHS staff and administration, support a strong case for PLATO's impact. Certainly, the CCHS principal and the district assistant superintendent attribute much credit to PLATO. As of this writing, every one of the 320 students who used the Y.E.S. lab to earn needed credit, graduated from CHHS. The stakes are high in North Carolina. It is questionable, even doubtful, that these students would have graduated if they were required to re-take the course and/or pass the end-of-course test. The fact that this strategy allowed students to keep up with classmates, progress and graduate should not be lost in a flurry of statistical tests. Clearly, the encouraging fact is that the combination of PLATO and the efforts of skillful and dedicated teachers *together* made a difference. Bear in mind that in the case of students who failed the NCCT, they had already failed the NCCT test when they only had the benefit of classroom instruction so it is logical to conclude that adding PLATO to the mix was critical.

Do the students who earn course credit in the Y.E.S. lab know the material as well as the students who passed it the first time, or as well as if they had re-taken the full course? We cannot

determine. Students are not required to re-take and pass the end-of-course exams so we have no exit measure external from the PLATO mastery exams.

The Y.E.S. program helps and to some extent tailors to, the low achieving students. But it also provides a safety net for (otherwise) capable student who have a low interest/aptitude in one particular subject.

NCCT scores for December 2000 and May 2001 improved for students working in PLATO. The strategy of supporting PLATO with a certified teacher in the lab was quite effective. It does seem that Ms. Scott's and Ms. Creamer's beliefs that "PLATO brought our failure rate down" is defensible. The fact that student PLATO performance was related to higher test scores suggests as much.

One important benefit to these strategies is their practicality. The time and resources that would be needed if faculty had to remediate all of the students served by the YES program is a sobering thought. And the time *students* would have to spend in re-taking failed courses would certainly cause some of them to fall behind, and drop out. The fact that students are willing to come after school and/or during the summer to make up coursework is encouraging, and makes the Y.E.S. model worthy of serious consideration by other school districts.

The Y.E.S. program seems to work extremely well. Whether this model can be replicated depends on several factors aside from the investment in the lab equipment. First, a flexible teacher who is willing to cover several content areas must be identified. Ms. Scott has taken on this role that requires a blend of skills, both personal and professional. Second, the administration must relinquish some control, and be flexible enough to schedule students in and out of labs for NCCT review as needed. The combination of PLATO's flexibility and the

personal and professional dedication of the CCHS faculty have resulted in the successful implementation.

The faculty did not try to use PLATO for something for which it was not intended. PLATO modules are discrete units of instruction. The teacher's role is to establish and overall meaningful context for learning with PLATO, and thus to make the learning experiences purposeful. At CCHS, they were used for skill acquisition and remediation. And importantly, the teachers invested the time upfront in customizing the PLATO modules to be used in courses remediation. CCHS made a large investment in time to ensure the program's success. The importance of this huge commitment in time and resources toward remediating these students cannot be overemphasized.

A consequence of high-stakes testing is that remediation usually comes at some cost. What did the 27 students miss while they were in the review course drilling for the NCCT? This is more of a philosophical question than a practical one, and as long as graduation requirements require passing an exam like the NCCT, it is a one that educators can afford to contemplate. They have a professional and ethical responsibility to do everything they can to get all students through school with a degree. On the other hand, evaluating what these students *gained* from the NCCT course is a more practical and worthwhile exercise. Students were in an environment with caring, dedicated staff who helped instill in them confidence that a diploma was achievable and encouraged them to believe in themselves. With regard to the remediation program for required courses, 320 students earned credit after school and during summers since January 1999, costing them nothing terms of lost curriculum opportunities. And it could be safely speculated that many of these 320 students would not have graduated from CCHS without the YES option.

About the evaluator:

Robert D. Hannafin is an associate professor of Instructional Technology at the College of William and Mary, where he teaches preservice teachers at the graduate and undergraduate levels. He earned a Ph. D. in Instructional Technology from Arizona State University in 1994. His research interest is identifying features of computer-supported open-ended learning environments that contribute to learning gains. He has published in numerous educational research journals including the *Journal of Educational Psychology*, *Educational Technology Research and Development*, and the *Journal of Educational Research*. Hannafin serves as a board member of *Educational Technology Research and Development* and recently served as guest editor for a special issue in that journal. He has served as evaluator or co-evaluator on several grants.

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